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REPORT NO. 37
Issued March 1976

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SHIGELLA

surveillance

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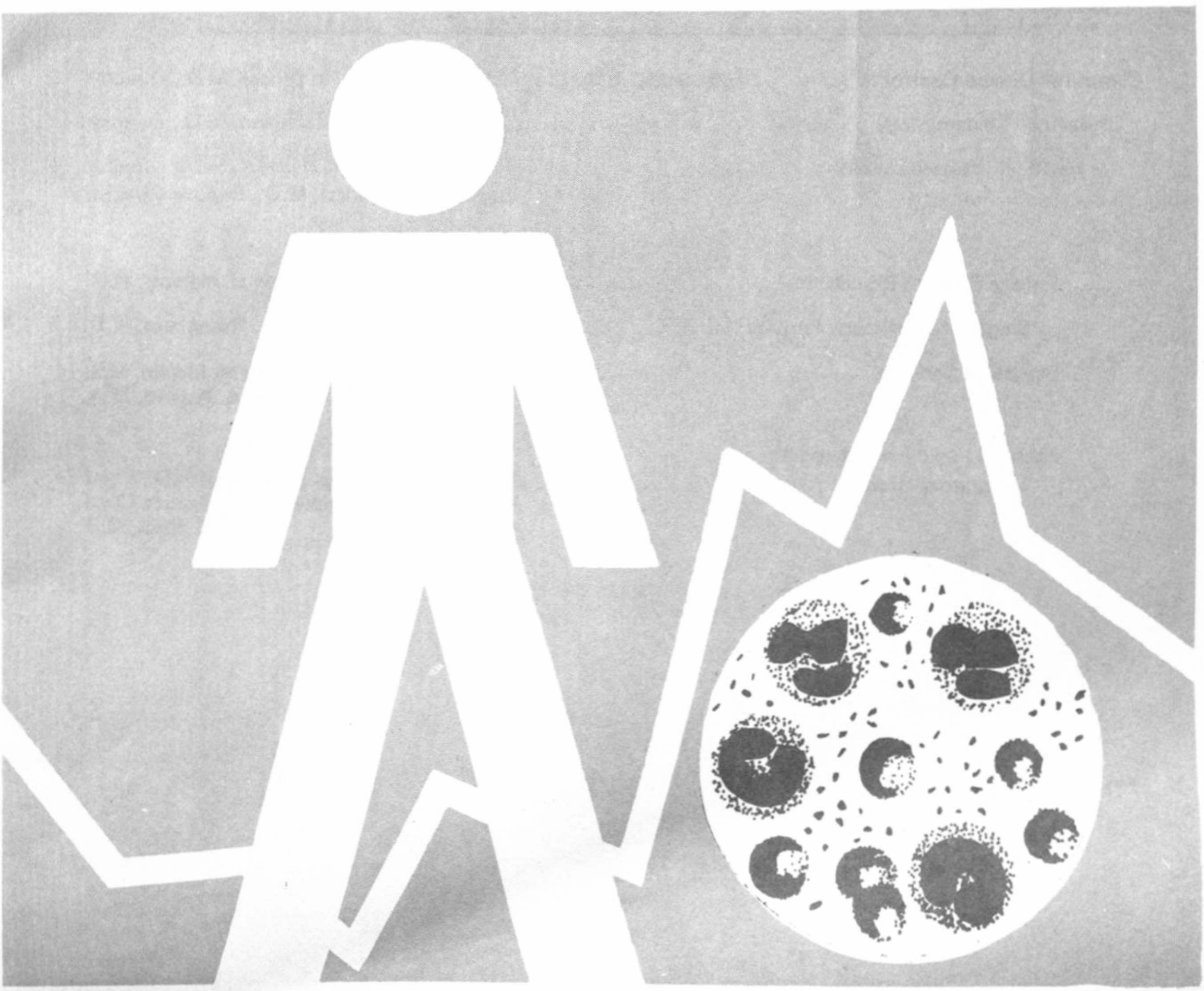
for the
Third and Fourth Quarters



U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE: PUBLIC HEALTH SERVICE

PREFACE

This report summarizes data voluntary reported from partivipating states, territorial, and city health departments. Much of the information is preliminary. It is intended primarily for the use of those with responsibility for disease control acitvities. Anyone disiring to quote this report should contact the original investigators for confirmation and interpretation.

Contributions to the surveillance report are most welcome. Please address to:

Center for Disease Control
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Atlanta, Georgia 30333

SUGGESTED CITATION

Center for Disease Control: Shigella Surveillance Report No. 37
Third and Fourth Quarters; issued March 1976

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*Through June 1975

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I. SUMMARY

For the period July through December 1974, 10,193 shigella isolations from humans were reported. This represents an increase of 981 (10.6%) over the 9,212 isolations reported for the preceding 6 months and a decrease of 23 (0.2%) from the 10,216 isolations reported for the corresponding months of 1973 (Tables I-A and I-B).* This decrease in reported isolations probably represents a somewhat greater decrease than that indicated since the 1974 total included 2,243 isolations from California whose isolations had not been included in the 1973 totals.

Approximately 48.2 isolations per million population were reported for the second half of 1974, a decrease of 12.5% from the 55.1 isolations per million for the second half of 1973.

II. REPORTED ISOLATIONS

A. Human

1. General Incidence. For the last 6 months of 1974, 64.2% of reported isolations were from children under 10 years of age (Table 1); this is consistent with previous 6-month periods. The highest rate of isolation was in the 1-4 age group.

Table 1

Cases of Shigellosis, by Age and Sex, Third and Fourth Quarters 1974*

Age (Years)	Male	Female	Unknown	Total	Percent	Cumulative Percent	Isolations per Million Population**
Under 1	184	132	4	320	5.6	5.6	118.1
1 - 4	1140	1100	6	2246	39.6	45.2	187.4
5 - 9	538	540	1	1079	19.0	64.2	68.1
10 - 19	350	321		671	11.8	76.0	18.0
20 - 29	262	471		733	12.9	88.9	23.5
30 - 39	148	186		334	5.9	94.8	14.9
40 - 49	46	61		107	1.9	96.7	5.1
50 - 59	21	49		70	1.2	97.9	3.5
60 - 69	23	44		67	1.2	99.1	4.4
70 - 79	9	18		27	.5	99.6	3.1
80 or over	4	11		15	.3	99.9	3.8
Subtotal	2725	2933	11	5669			
Child (Unspec)	11	15	1	27			
Adult (Unspec)	8	14		22			
Unknown	1098	1105	29	2232			
Total	3842	4067	41	7950			
Percent	48.6	51.4					

* California not included

**Census estimates for 1974 from "Current Population Reports", Series P-25, No. 533

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* California did not report on a regular basis in 1973

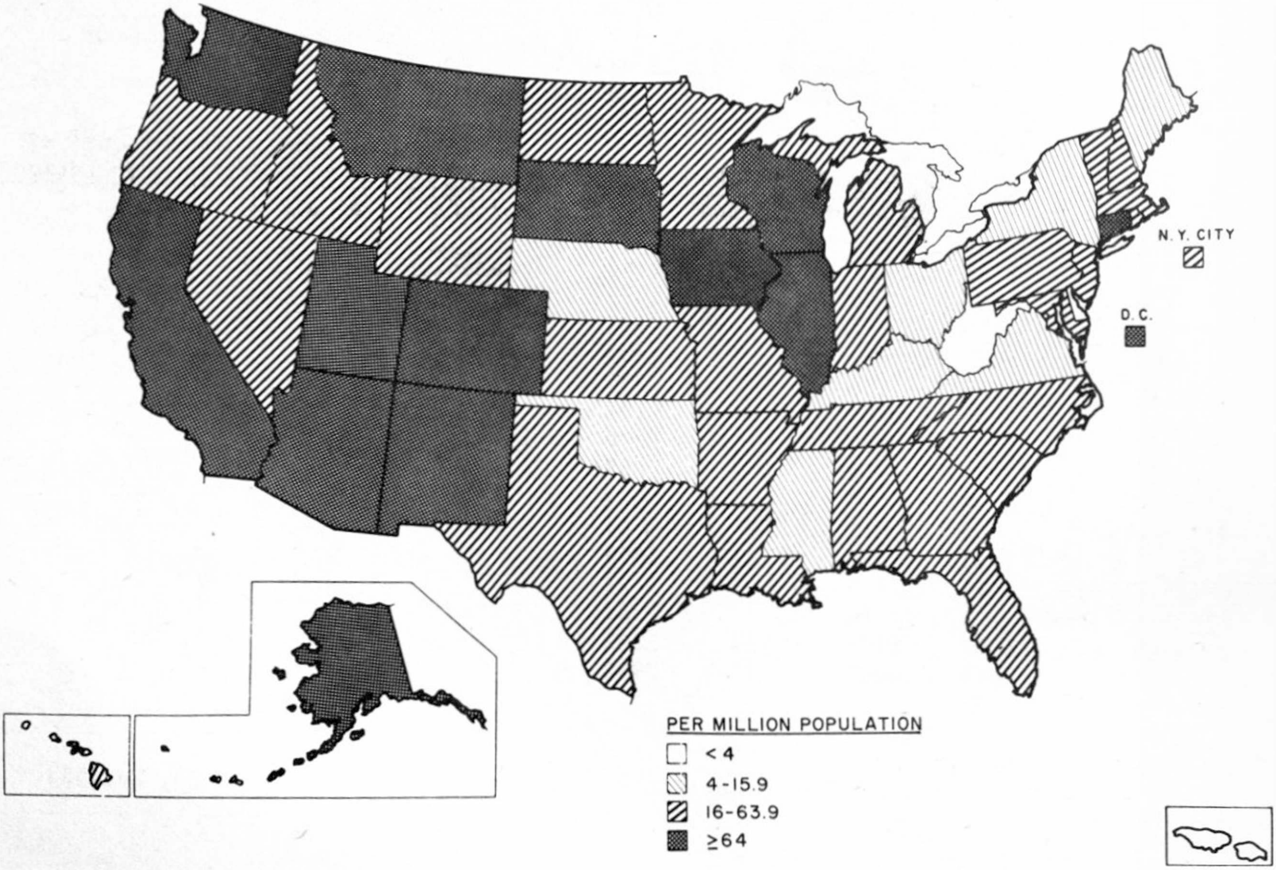
2. Serotype Frequency.- Fifty-three of the 54 centers participating in the Shigella Surveillance Program reported isolations of 26 different shigella serotypes.

Isolations not serotyped were distributed among serotypes in the same proportions as the isolations that were serotyped (Table II). The resulting distribution in the tables is called the "calculated number", and from this is derived a "calculated percent" for each serotype. These provide approximate indices of the relative frequency of reporting of the shigella serotypes in the United States. S. sonnei accounted for approximately 71.2% of all reported isolations. The next most common serotypes were S. flexneri 2a (7.6%), S. flexneri 6 (4.8%), S. flexneri 4a (2.5%) and S. flexneri 1b (2.4%).

Table III shows the distribution by state of shigella serotypes reported from mental institutions.

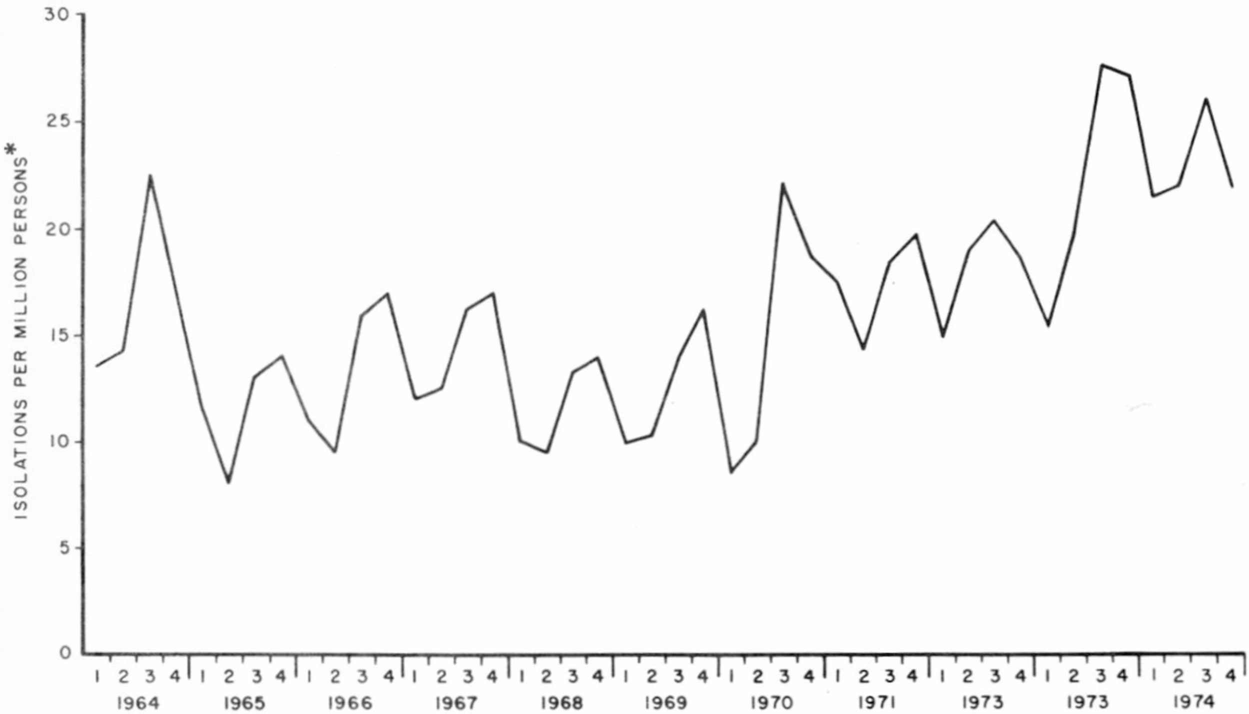
3. Geographical and Seasonable Observations. Figure 1 shows the number of reported isolations (per million population by 1970 census data) by state for the period July through December 1974. There were more reported isolations of S. sonnei than S. flexneri in all but the following 7 states: Delaware (0:0),* Oregon (18:24), South Dakota (19:41), Wyoming (2:7), Arkansas (42:46), Arizona (223:343), and New Mexico (87:190). The seasonal distribution, peaking in fall and winter, is depicted in Figure 2. Table 2 shows the general type of residence of those patients from whom shigella was isolated and reported.

Fig. 1 ATTACK RATES OF SHIGELLOSIS, BY STATE, JULY-DECEMBER 1974



*The first figure in parenthesis is the number of reported isolates of S. sonnei, the second is the number of reported S. flexneri.

Fig. 2 REPORTED ISOLATIONS OF SHIGELLA, BY QUARTER, UNITED STATES, 1964-1974



*INCLUDES ONLY PERSONS IN STATES AND TERRITORIES WITH PARTICIPATING REPORTING CENTERS

Table 2

Reported Isolations of Shigella, by Residence at Time of Onset, Third and Fourth Quarters, 1974*

Source	Jul	Aug	Sep	Oct	Nov	Dec	Total	Percent of Subtotal
Mental Institutions	28	15	82	96	35	40	296	7.3
Indian Reservations	7	10	47	6	8	11	89	2.2
Other Residences	743	686	633	689	531	414	3696	90.6
Subtotal	778	711	762	791	574	465	4081	
Residences Unknown	785	799	641	770	529	455	3979	
Total	1563	1510	1403	1561	1104	920	8060	

*California not included

B. Nonhuman

For the period July through December 1974, 55 isolations from nonhuman sources were reported; 54 of them from primates (Table IV).

III. REPORTS FROM THE STATES

A. Shigellosis from Swimming, Dubuque, Iowa

Reported by John Schaefer and Ray Ann Moriarity, Bacteriology Laboratories, Mercy Medical Center; Mary Gleason Kline, Frances Kringle, Glenann Slade, Mary Jane Toner, Mary Unsen, Public Health Nurses, and Arthur J. Roth, Jr., M.P.H., City Health Administrator, Dubuque City Health Department; David Kunkel, Sanitarian, and Isabel Hagge, Public Health Nurse, Dubuque County Health Department; Kenneth K. Hazlet, M.D., Director, Dubuque City and County Health Departments; Kim Deppe, Public Health Nurse, Jackson County Health Department; Franklin P. Koontz, Ph.D., Assistant Director, William J. Hausler, Ph.D., Director, Iowa State Hygienic Laboratories; Kenneth Choquette, Director, Health Engineering Section, William Permar, Robert Olsen, Frank Thompson and Charles A. Herron, M.D., State Epidemiologist, Iowa State Department of Health; and Mark L. Rosenberg, M.D., Enteric Diseases Branch, Bacterial Diseases Division, Bureau of Epidemiology.

In August 1974, 31 of 45 cases of *Shigella sonnei* infection in Dubuque, Iowa, were traced to swimming in a 5-mile stretch of the Mississippi River. Comparison of the first case in each affected family with neighborhood controls revealed a significant correlation between swimming and illness ($p<.0001$). A significant association between diarrheal illness and swimming ($p<.001$) was also demonstrated by a retrospective survey of 60 families who had camped at a park beside the river; the attack rate for swimmers who got water in their mouths while swimming was 18%. They had been swimming in water where the mean fecal coliform count was 17,500 organisms per 100 ml; the federal recommended upper limit for swimming water is 200 per 100 ml. A water sample obtained at the park swimming area 1 month after authorities had banned swimming in the area yielded *S. sonnei* with the same antibiogram, colicin type, and phage type as the isolates from 6 swimmers.

Editorial Notes: Epidemiologic and laboratory data strongly implicated swimming in the Mississippi River as the predominant mode of acquisition of shigellosis in this outbreak.

Swimming in polluted water has not previously been documented as a mode of transmission of shigellosis. In this study, only swimmers who had taken river water into their mouths had a significant risk of illness, suggesting that ingestion of contaminated river water was necessary to cause disease. The small number of shigellae necessary to cause disease--10^1-10^2 compared with 10^8 enterotoxigenic *Escherichia coli* or 10^8 *Vibrio cholerae* (1)--could easily be ingested without a swimmer's being conscious of swallowing water. It also suggests that swimmers in polluted water may be at risk of contracting other enteric illnesses that can be acquired by ingesting a relatively small number of organisms. Salmonellosis may be transmitted by 10^4 organisms (2), and some enteric viral illnesses may follow the ingestion of a single virus particle (3).

Other modes of transmission could not explain this outbreak. It is unlikely that person-to-person spread was responsible for the spread of illness among the different families in this study, since only 2 of the 29 index patients gave a history of direct or indirect personal contact with patients in other families. Person-to-person spread among separate families of the camping cohort that was studied retrospectively was also unlikely, since families visited the area at different times over a 1-month period and had no common associations other than having used the same camping area. Spread of shigellosis by contaminated food or water consumed at swimming areas was also a possibility, but no common food or drinking water source was shared, and the correlation between consumption of food or water and illness was not significant. The causal association between swimming and shigellosis was further strengthened by the isolation of shigella from water where 10 patients had been swimming.

The common antibiogram, colicin type (4), and phage type shared by the shigellae isolated from the swimming area and from 7 swimmers suggested a common source. One possible source was a small creek which emptied into the slough immediately above the camping park bench and which had unexplained high-coliform counts on many occasions. The infectious shigellae could also have come from the sewage treatment plant upstream from the swimming areas. Shigellae added to river water have been recovered up to 4 days later, with shorter survival times in less-aerated samples (5). With a survival time of 2 days, shigellae discharged into the river 5 miles above the swimming area would have to travel only 1/10 miles per hour to reach the swimming area while still alive. Since the current velocity in the river channel near Dubuque is 2-4 miles (6), the Dubuque sewage treatment plant outfall could have been the source of the shigellae that infected swimmers in this outbreak. This outfall would be expected to contain increasing numbers of shigellae as more city residents got sick. The source of shigellae could also have been the feces of 1 or more ill swimmers contaminating the water near other swimmers. But if shigellae survive only about 4 days in river water, recovery of an isolate 1 month after imposition of a ban on swimming make that source unlikely.

According to the standards set by the Environmental Protection Agency, the water in which these people swam was bacteriologically unfit for swimming. At all sampling points on the river for 5 miles below the sewage treatment plant outfall the mean fecal coliform counts were much higher than the recommended maximum of 200 fecal coliforms per 100 ml. The high shigellosis attack rate for swimmers who got this water in their mouths suggests that the risk of illness to swimmers in polluted water is thus very real. Health authorities and clinicians should be alert to illness associated with swimming since this mode of spread may easily go unrecognized. Administrators and public health personnel faced with the conflicting objectives of maximizing the public's access to recreational waters and minimizing the risks to their health need information that will allow them to quantify these risks. If rational decisions are to be made this information is badly needed.

References:
1. DuPont HL, Hornick RB: Clinical approach to infectious diarrheas. Medicine 52: 265-270, 1973
2. Armstrong RW, Fodor T, Curlin GT, et al: Epidemic salmonella gastroenteritis due to contaminated imitation ice cream. Am J Epidemiol 91:300-307, 1970
3. Katz M, Plotkin SA: Minimal infective dose of attenuated polio-virus for man. Am J Public Health 57:1837-1840, 1967
4. Morris GK, Wells JG: Colicin typing of *Shigella sonnei*. Appl Microbiol 27:312-316, 1974
5. Dolivo-Dobrovol'skii LB, Rossovskaia VS: Survival of *Shigella dysenteriae* in water supply, Gigiena i San, 21 p 52, 1956
6. Office of the Division Engineer, Corps of Engineers, North Central Division, Chicago, Illinois: Division bulletin no. 2, navigation conditions for 1974, March 1974, p 13

B. Shigellosis at a Custodial Institution, Brandon, Vermont

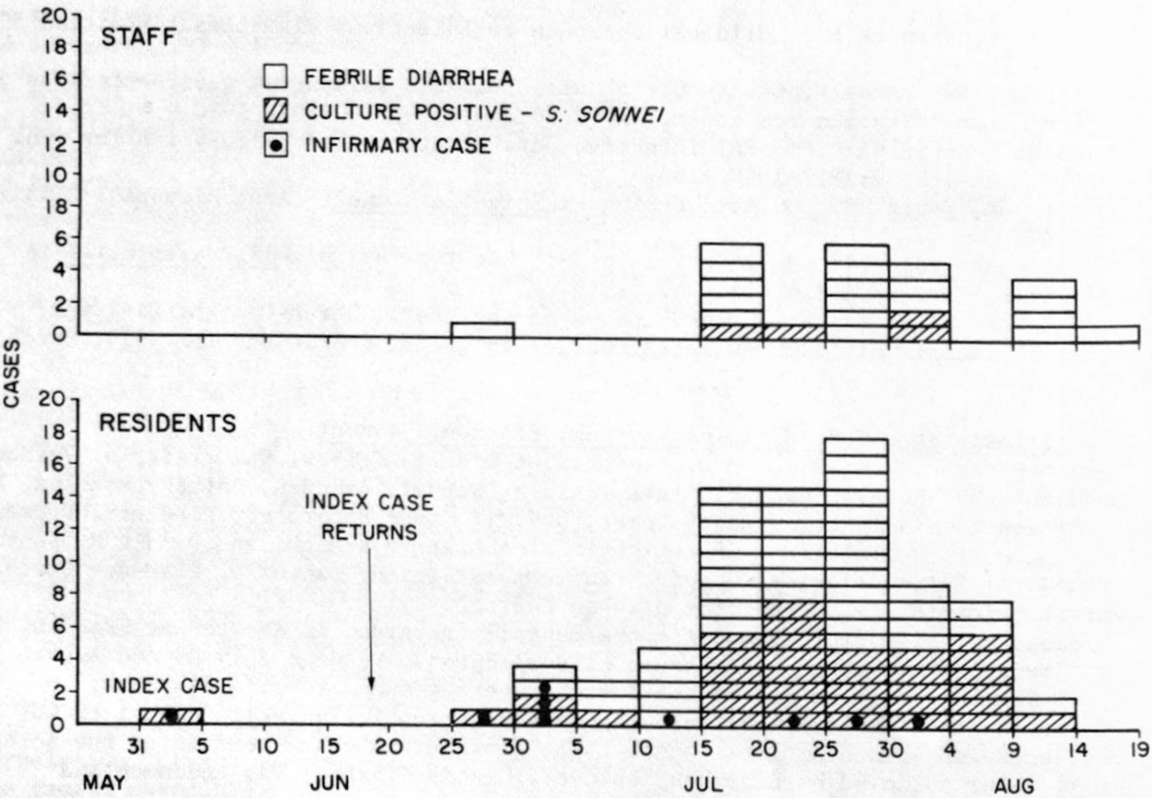
Reported by Mark Aronson, M.D., Infectious Disease Fellow, University of Vermont, Raymond Mulcahy, Superintendent, State Training School, Brandon, Anthony Robbins, M.D., State Health Commissioner, Dymetry Pomar, D.V.M., State Laboratory Director, Vermont, Joy G. Wells, Epidemiological Investigations Laboratory Branch, and Dennis R. Shaberg, M.D., Medical Epidemiologist, Hospital Infections Branch, Bacterial Diseases Division, Bureau of Epidemiology, Center for Disease Control.

Vermont's residential school for the mentally retarded is located at Brandon, a small farming community 50 miles south of Burlington. Between July 25 and August 19, 1974, 80 school residents and 24 staff members experienced febrile diarrhea. Of the 104 infected individuals, stool cultures were positive for *Shigella sonnei* in 40; 36 in residents and 4 in school personnel. The disease was characterized by the abrupt onset of fever followed by diarrhea; however, bloody diarrhea was uncommon and occurred in only 6 patients. There were no deaths.

Shigellosis was probably introduced into the school by the suspect index case, an 8-year-old training school resident transferred to a large hospital in Burlington (Chittenden County), Vermont, on May 28, 1974, for corrective orthopedic surgery. On May 29, the surgery was performed, and on May 31 the patient developed high fever to 104^{o}. On June 1 she developed diarrhea, and a stool culture grew *Shigella sonnei* sensitive to many antibiotics, including tetracycline and ampicillin. The isolate from this patient was the only isolate received in the Vermont State Laboratory in June from anyone outside Chittenden County, and her infection appeared to be part of a community-wide outbreak of shigellosis occurring in Burlington at that time (Table 1). After treatment with an 8-day course of ampicillin, the patient's stool culture was negative for shigella, and she returned from Burlington to the school infirmary on June 18. She was not isolated and moved freely in the infirmary in a wheelchair. She had frequent contact with the other infirmary patients in that she enjoyed undressing herself and other patients and did so whenever she was not restrained. She was not toilet trained.

Figure 3 shows the distribution of cases of febrile diarrhea in residents and staff at the school. Four of the first 5 cases were in infirmary patients who had frequent contact with the index case. The attack rate for long-term residents of the infirmary was highest of all dormitory areas. Between June 18, the date of the index patient's return to the infirmary, and July 16, the date school officials became aware of the magnitude of the epidemic and isolated her and other infirmary cases, 26 residents had had contact with these patients for varying periods of time. In almost all cases, the first case on each of the wards was an individual who had been discharged from the infirmary prior to onset of his diarrhea.

Fig. 3 CASES OF FEBRILE DIARRHEA AT A TRAINING SCHOOL, BRANDON, VT., MAY - AUGUST 1974



Colicin typing was performed on shigella isolates from Brandon residents and from 4 patients in the Burlington community; all isolates were colicin type 7. Antibiograms were identical for the isolates from the cases in Burlington and Brandon. Cultures were positive after 10 days of ampicillin therapy in 4 school residents, and in 3 of the 4, the post-therapy isolate was resistant to ampicillin.

Editorial Notes: No contaminated food or water vehicle was implicated in this outbreak, and person-to-person transmission was the probable mode of spread at the school. The infirmary was the initial focus, and patients transferred from the infirmary could be traced to all but 2 of the involved dormitories; the first case in each of these dormitories appeared to be a patient transferred from the infirmary. The low inoculum size needed to transmit shigellosis (1) facilitated person-to-person transmission in the school. The fact that shigellosis was not an endemic problem suggests that the residents had had little previous experience with the organism, and therefore, susceptibility was high. Fecal-oral transmission so common in custodial institutions facilitated person-to-person spread. In addition, many of the residents of the school had underlying neurologic and other chronic diseases contributing to the susceptibility of this population to shigellosis.

The role of staff-to-patient spread of the organism could not be completely assessed because patient-to-patient contact could not be separated from staff-to-patient contact. However, the high attack rate among staff suggests that handwashing and patient-care practices and techniques were less than optimal. All patients had a great deal of staff-to-patient contact, and attempts to select those factors which increased this staff-to-patient contact such as requiring that the patient be fed or dressed by the staff failed to demonstrate any increased risk for disease. When patients were unable to go to the dining area to eat and, therefore, took their meals in the day-care area, the incidence of shigellosis increased. This may be due to the fact that the dining area was cleaned after every meal by staff and the day-care area was not so cleaned. Therefore, the chance for contaminating hands or utensils was much greater in the day-care area.

Shigellosis has long been a major problem in custodial institutions. Isolation techniques have been less than optimally effective, and prophylactic use of antibiotics has been generally unsuccessful in curbing epidemic spread of shigellosis in custodial institutions. Although attenuated shigella vaccines have been developed, they are still investigational and further study will be needed before they can be considered in the prevention of shigellosis (2). Until more effective vaccines or other methods of control become available, the results of this investigation underscore the necessity for continued vigilance for diarrheal diseases in custodial settings. Once introduced into a custodial setting, shigella may become endemic (3).

Suspect cases should be isolated as soon as the clinical suspicion is present without awaiting culture confirmation. Staff working with patients with diarrhea should be reminded frequently of the need for handwashing and other hygienic principles both to prevent transmission of disease and to prevent unnecessary infection in staff. During this epidemic of shigellosis, restriction of staff movement and cohorting of ill and well patients seemed to help in controlling spread in those dormitories where a minimum of self-care among residents was present. Because of the high attack rate in some dormitories, ultimate lack of susceptibles may have been the reason for interruption of spread.

The following control measures were recommended:

1. That new admissions and community placements be curtailed during periods of transmission.
2. That case definition be expanded to include all clinically suspect cases and not just culture-proven cases. Any patient with diarrhea should be presumed infectious until proved to be shigella negative.
3. That persons in dormitories with culture-proven cases be isolated and kept from intermingling with other dormitory groups.
4. That iodophor handwashing be instituted along with enteric precautions.
5. That modified cohorting of staff be instituted, i.e., dividing each dormitory into sections with ill and well patients and assigning nursing personnel to care for only ill or only well patients.
6. That a culture survey be conducted to determine if there were carriers on the staff.
7. That an infection committee be established to review surveillance information on an ongoing basis.

References:
1. DuPont HL, Hornick RB, Dawkins AT, Snyder MJ, Formal SB: The response of man to virulent Shigella flexneri 2a. J Infect Dis 119:296-299, 1969
2. Levine MM, Gangarosa EJ, Werner M, Morris GK: Shigellosis in custodial institutions. III. Prospective clinical and bacteriologic surveillance of children vaccinated with oral attenuated shigella vaccines. J Pediatr 84:803-806, No. 6, June 1974
3. DuPont HL, Gangarosa EJ, Reller LB, Woodward WE, Armstrong RW, Hammond J, Glaser K, Morris GK: Shigellosis in custodial institutions. I. Amer J Epidemiol 92:172-179, No. 3, 1970

IV. RECENT ARTICLES FROM THE LITERATURE

A. Comparative efficacy of cephalexin and ampicillin for shigellosis and other types of acute diarrhea in infants and children. Nelson JD and Haltalin KC. Antimicrob Agents Chemother 7:415-420, 1975

Considering the rapidly increasing problem with ampicillin resistance of Shigella sonnei strains in the United States it becomes important to look for suitable alternative drugs for treatment of severe shigellosis. Shigella strains that are resistant to multiple drugs, i.e., sulfas, tetracycline, chloramphenicol, and ampicillin generally retain their in vitro susceptibility to cephalosporin derivatives. In a previous study the authors found that only 1 of 160 shigella strains was resistant to cephalothin, cephaloridine, cephaloglycin and cephalexin. Cephaloglycin proved ineffective for shigellosis, presumably on the basis of the poor absorption, with most patients having no measurable levels of cephaloglycin in their blood. It therefore seemed worthwhile to carry out a clinical trial with cephalexin, which has much better absorption than cephaloglycin and quite consistently gives peak serum levels over 10 ug/ml with the recommended dosages.

Randomized treatment with cephalexin or ampicillin was given to 154 infants and children with acute diarrhea. Rectal swab cultures revealed shigella in 42%, salmonella in 6%, enteropathogenic Escherichia coli in 2%, and no pathogen in 50%. Cephalexin failed to eradicate shigella after 5 days of treatment in 76% of patients compared with 28% of ampicillin-treated patients with susceptible organisms. Shigella persisted in 78% of ampicillin-treated patients with resistant organisms. Diarrhea lasted more than 5 days in 43% of cephalexin-treated patients, in 56% of the ampicillin group with resistant organisms, but in only 9% of ampicillin-treated patients with susceptible organisms. The failure of cephalexin was due to the relatively high minimal inhibitory concentrations and minimal bacterial concentrations of 5 or 10 ug/ml and, although serum concentrations were twice the minimal bacterial concentration, they were not sufficient to demonstrate killing by the serum dilution method. In vitro susceptibility or resistance of shigella to ampicillin correlated with clinical success or failure. Cephalexin is not a suitable drug for treatment of shigellosis in patients with ampicillin-resistant organisms.

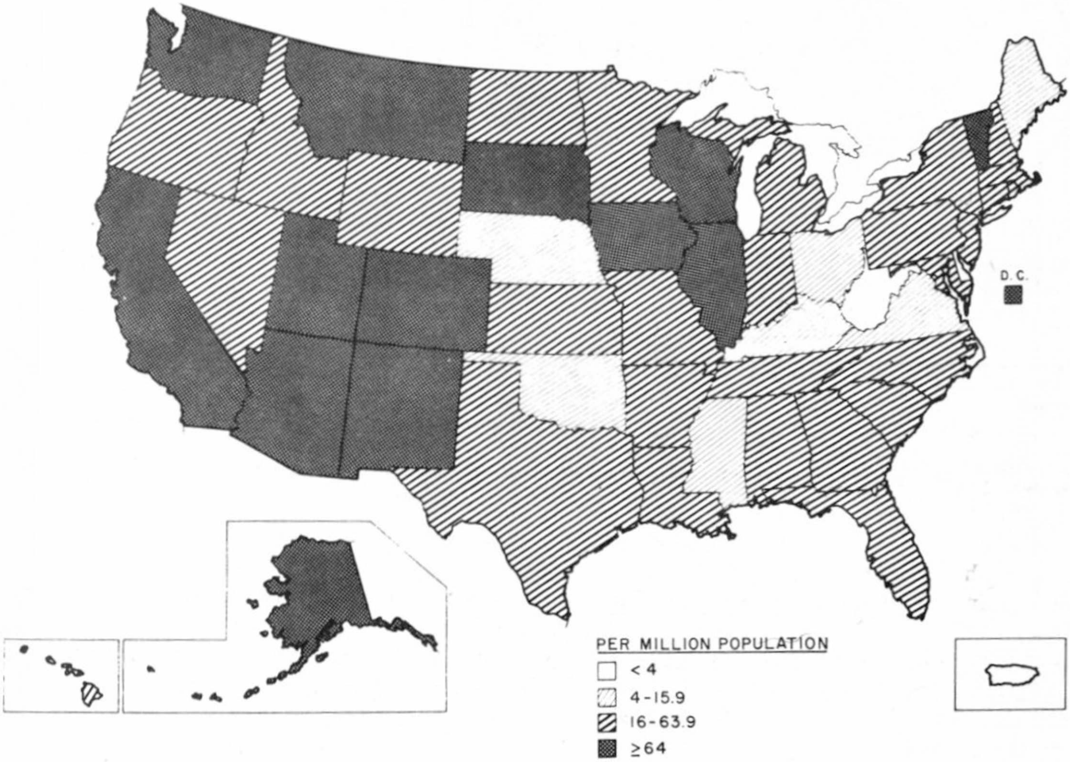
B. Chronic vulvovaginitis in children due to Shigella flexneri. Davis TC. Pediatrics 56:41-44, 1975

Although earlier reports implicated Shigella flexneri in resistant or chronic cases of vulvovaginitis in children, clinical characteristics of this condition had not been previously described. This report describes 4 cases of persistent vulvovaginitis in prepubertal Indian girls from different reservation communities in Arizona. S. flexneri was isolated in pure culture from the vaginal discharge of each patient. All 4 cases were characterized by a prolonged vaginitis with a bloody, purulent discharge which responded poorly or not at all to various topical modes of therapy for nonspecific vaginitis. Three cases cleared completely when treated with ampicillin given orally for 1 week. The striking similarity of these cases suggests that chronic shigella vulvovaginitis is a recognizable clinical entity and should be considered in the differential diagnosis of vaginitis in children, especially in those from communities where shigella is endemic.

V. SHIGELLA SURVEILLANCE: ANNUAL SUMMARY FOR 1974*

In 1974, a total of 19,420 isolations of shigella was reported to CDC. This was an increase of 15.1% from the 16,868 isolations reported in 1973.** Utilizing the population estimates for July 1, 1974, the overall United States attack rate was 75.7 reported isolations per million population in 1974, compared with 89.5 and 66.0 reported in 1973 and 1972, respectively.** Attack rates by state are shown in Figure 4.

Fig. 4 ATTACK RATES OF SHIGELLOSIS, BY STATE, 1974



The age and sex distribution of persons from whom shigella was isolated in 1974 is presented in Table V. Children 1 to 4 years of age were at greatest risk, with an attack rate of 343.8 per million.

The seasonal distribution of previous years persisted, with the greatest number of isolates reported each autumn (Figure 2).

Table VI shows the relative frequency of all shigella serotypes reported in 1974. The trend which had been noted since the fourth quarter of 1966 toward an increasing proportion of all isolates being S. sonnei may have leveled off (Figure 5). Concomitantly, S. flexneri has progressively decreased in proportion of total isolations.

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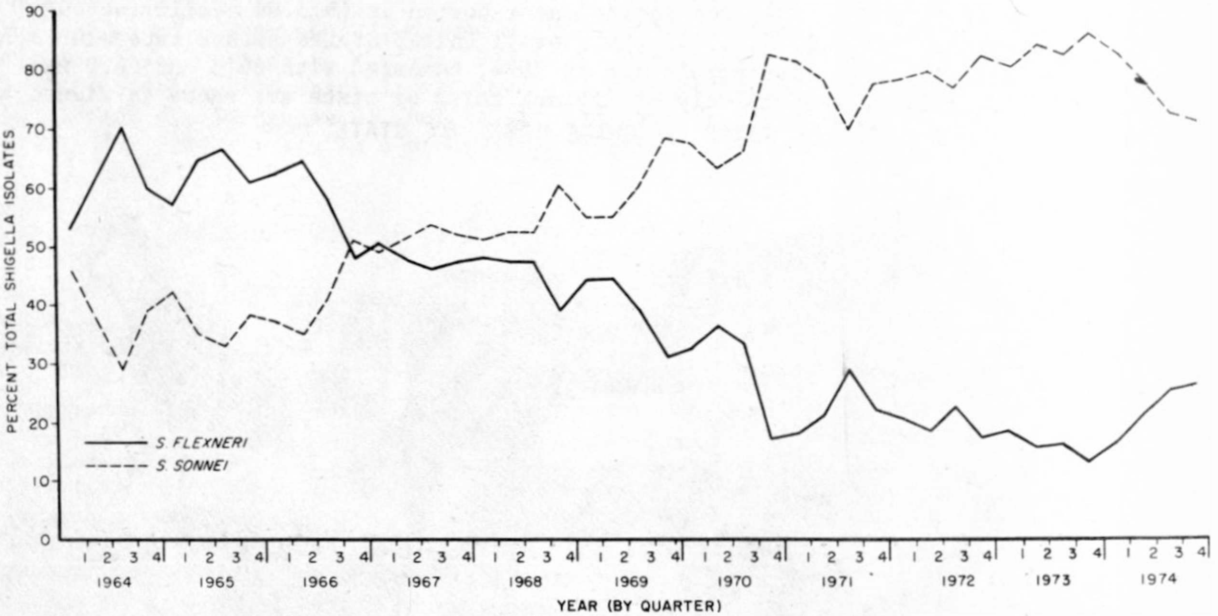
* This summary is based upon preliminary reports compiled quarterly through December 13, 1974. Additions or corrections will be published in a subsequent report.

**Since reports were not received on a regular basis from California in 1972 and 1973, but total numbers of California isolates were reported in 1974, these figures are not directly comparable.

Fig. 5 **RELATIVE FREQUENCY OF ISOLATIONS OF SHIGELLA SPECIES IN THE UNITED STATES, 1964-1974**



S. DYSENTERIAE
S. BOYDII } EACH SEROTYPE ACCOUNTS FOR LESS THAN 2% OF TOTAL SHIGELLA ISOLATES EACH YEAR

SHIGELLA TABLES

TABLE I

SHIGELLA SEROTYPES ISOLATED FROM HUMANS

FOURTH QUARTER, 1974

NORTHEAST

SEROTYPE	CONNECTICUT	DELAWARE	DISTRICT OF COLUMBIA	ILLINOIS	INDIANA	IOWA	KENTUCKY	MAINE	MARYLAND	MASSACHUSETTS	MICHIGAN	MINNESOTA	MISSOURI	NEW HAMPSHIRE	NEW JERSEY	NEW YORK–A	NEW YORK–BI	NEW YORK–C	OHIO	PENNSYLVANIA	RHODE ISLAND	VERMONT	VIRGINIA	WEST VIRGINIA	WISCONSIN	NORTHEAST TOTAL
A.S. DYSENTERIAE																										
Unspecified													1													1
1				1						1																2
2				10																						10
3				1																						1
9																										0
Total	**0**	**0**	**0**	**12**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**14**
B.S. FLEXNERI																										
Unspecified			1		5					2			12	1		11	2	17		8	5		3		1	68
1 Unspecified							1																		1	2
1a				6						1	1								1							9
1b				1							1															2
2 Unspecified									8				1						2						4	15
2a	5			11						3	7	2	1		1											30
2b				3						1																4
3 Unspecified													1		2				1						3	7
4a				19			1			2	4															26
3b																										0
3c	3									6		2														11
4 Unspecified					1				1																1	3
4a	1			3							1								1							6
4b																										0
5				1																					1	
6				5			1		1	3		1	1													12
Variant Y																										0
Total	**9**	**0**	**1**	**49**	**6**	**0**	**3**	**0**	**10**	**18**	**14**	**5**	**16**	**1**	**3**	**11**	**2**	**17**	**5**	**8**	**5**	**0**	**3**	**0**	**10**	**196**
C.S. BOYDII																										
Unspecified																1				1						2
1																										0
2										1																1
4																										0
9																										0
10																										0
14																										0
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**3**
D.S. SONNEI	74		55	257	37	78	12	4	34	127	217	60	37	13	55	50	19	96	45	95	3	17	22	2	87	1,496
Unknown			4								4														1	9
Total	83	0	60	318	43	78	15	4	44	147	235	65	54	14	58	62	21	113	50	104	8	17	25	2	98	1,718

NORTHWEST

SEROTYPE	COLORADO	IDAHO	KANSAS	MONTANA	NEBRASKA	NEVADA	NORTH DAKOTA	OREGON	SOUTH DAKOTA	UTAH	WASHINGTON	WYOMING	NORTHWEST TOTAL	NORTH TOTAL
A.S. DYSENTERIAE														
Unspecified												1	1	2
1													0	2
2													0	10
3								1					1	2
9													0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**1**	**2**	**16**
B.S. FLEXNERI														
Unspecified	17			2		1		15	7			4	46	114
1 Unspecified										8	5		13	15
1a						2							2	11
1b		4											4	6
2 Unspecified		1		3						14	4		22	37
2a			1	3			2						6	36
2b													0	4
3 Unspecified		1	1							1			3	10
4a													0	26
3b													0	0
3c													0	11
4 Unspecified				1							2		3	6
4a				3						1			4	10
4b													0	0
5													0	1
6			2							7	2		11	23
Variant Y													0	0
Total	**17**	**6**	**4**	**12**	**0**	**3**	**2**	**15**	**7**	**31**	**13**	**4**	**114**	**310**
C.S. BOYDII														
Unspecified													0	2
1													0	0
2		1		1									2	3
4											2		2	2
9													0	0
10													0	0
14													0	0
Total	**0**	**1**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**4**	**7**
D.S. SONNEI	51	14	46	49	6	1	3	7	12	69	87		345	1,841
Unknown											1		1	10
Total	68	21	50	62	6	4	5	23	19	100	103	5	466	2,184

TABLE I (Continued)

SHIGELLA SEROTYPES ISOLATED FROM HUMANS

FOURTH QUARTER, 1974

SOUTHEAST										SOUTHWEST						OTHER							PREVIOUS QUARTER		
ALABAMA	ARKANSAS	FLORDIA	GEORGIA	LOUISIANA	MISSISSIPPI	NORTH CAROLINA	SOUTH CAROLINA	TENNESSEE	SOUTHEAST TOTAL	ARIZONA	NEW MEXICO	OKLAHOMA	TEXAS	SOUTHWEST TOTAL	SOUTH TOTAL	ALASKA	CALIFORNIA	HAWAII	VIRGIN ISLANDS	OTHER TOTAL	TOTAL	PERCENT OF TOTAL	TOTAL	PERCENT OF TOTAL	SEROTYPE
																									A.S. DYSENTERIAE
									0					0	0		54		2	56	58	1.2	51	0.9	Unspecified
									0				4	4	4					0	6	0.1	6	0.1	1
									0	1			1	2	2					0	12	0.3	3	0.1	2
									0		1			1	1				1	1	4	0.1	6	0.1	3
									0		1			1	1					0	1	0.0	1	0.0	9
0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**2**	**0**	**5**	**8**	**8**	**0**	**54**	**0**	**3**	**57**	**81**	**1.7**	**69**	**1.2**	**Total**
																									B.S. FLEXNERI
	9				2	1			12	1	1	1	1	4	16		413			413	543	11.7	591	10.7	Unspecified
		1	1						2		21			21	23					0	38	0.8	33	0.6	1 Unspecified
								1	1	10			5	15	16			1		1	28	0.6	29	0.5	1a
				1					1	25			5	30	31					0	37	0.8	52	0.9	1b
4		5	1			5			15		20		2	22	37					0	74	1.6	85	1.5	2 Unspecified
				4				12	16	22		2	42	66	82	2		3		5	123	2.6	161	2.9	2a
				1					1	2			15	17	18					0	22	0.5	26	0.5	2b
1		3					2		6		39			39	45					0	55	1.2	57	1.0	3 Unspecified
		1		2				1	4	15			17	32	36					0	62	1.3	71	1.3	3a
									0				2	2	2					0	2	0.0	6	0.1	3b
				1					1					0	1					0	12	0.3	17	0.3	3c
		1				2			3		22			22	25					0	31	0.7	22	0.4	4 Unspecified
									0	11			8	19	19					0	29	0.6	56	1.0	4a
			2						2					0	2					0	2	0.0	3	0.1	4b
									0				1	1	1					0	2	0.0	5	0.1	5
		34					1	1	36	27	14		16	57	93	1		2		3	119	2.6	143	2.6	6
1									1					0	1					0	1	0.0			Variant Y
6	**9**	**45**	**2**	**11**	**2**	**8**	**3**	**15**	**101**	**113**	**117**	**3**	**114**	**347**	**448**	**3**	**413**	**6**	**0**	**422**	**1,180**	**25.3**	**1,357**	**24.5**	**Total**
																									C.S. BOYDII
									0	1				1	1		56			56	59	1.3	64	1.2	Unspecified
									0	1				1	1					0	1	0.0			1
									0	10			4	14	14					0	17	0.4	22	0.4	2
									0	2				2	2					0	4	0.1	5	0.1	4
									0				1	1	1					0	1	0.0			9
									0				2	2	2					0	2	0.0			10
									0				1	1	1					0	1	0.0	1	0.0	14
0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**14**	**0**	**0**	**8**	**22**	**22**	**0**	**56**	**0**	**0**	**56**	**85**	**1.8**	**94**	**1.7**	**Total**
26	16	85	84	70	5	40	17	65	408	89	56	9	202	356	764	17	550	9	3	579	3,184	68.4	3,904	70.5	*D.S. SONNEI*
													2	2	2		114			114	126	2.7	113	2.0	Unknown
32	**25**	**130**	**86**	**81**	**7**	**48**	**20**	**80**	**509**	**217**	**175**	**12**	**331**	**735**	**1,244**	**20**	**1,187**	**15**	**6**	**1,228**	**4,656**		**5,537**		**TOTAL**

TABLE IA

SHIGELLA SEROTYPES ISOLATED FROM HUMANS

THIRD QUARTER, 1974

NORTHEAST

SEROTYPE	CONNECTICUT	DELAWARE	DISTRICT OF COLUMBIA	ILLINOIS	INDIANA	IOWA	KENTUCKY	MAINE	MARYLAND	MASSACHUSETTS	MICHIGAN	MINNESOTA	MISSOURI	NEW HAMPSHIRE	NEW JERSEY	NEW YORK–A	NEW YORK–BI	NEW YORK–C	OHIO	PENNSYLVANIA	RHODE ISLAND	VERMONT	VIRGINIA	WEST VIRGINIA	WISCONSIN	NORTHEAST TOTAL
A.S. DYSENTERIAE																										
Unspecified	1																									1
1																										0
2																			1							1
3				1								1														2
4										1															1	2
9																										0
Total	1		0	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1
B.S. FLEXNERI																										
Unspecified			1		6	1				10	1		4	2		4	5	12		5					1	52
1 Unspecified																									1	1
1a				3							1	1														5
1b				1								1														2
2 Unspecified									16				2						3						1	22
2a	3			21						5	10	3			5											47
2b				6						1																7
3 Unspecified									2				4		9				2						3	20
3a				8						4	12															24
3b				1																						1
3c	10									1		2														13
4 Unspecified							1		1																	2
4a				3							1	6														10
4b																										0
5																									1	1
6				7					2	1	1	1	1												3	16
Total	13	0	1	50	6	1	1	0	21	22	26	14	11	2	14	4	5	12	5	5	0	0	0	0	10	223
C.S. BOYDII																										
Unspecified											1					1										2
2				1						1																2
3																										0
4												1													1	2
5																										0
14										1																1
Total	0	0	0	1	0	0	0	0	0	2	1	1	0	0	0	1	0	0	0	0	0	0	0	0	1	7
D.S. SONNEI	95		21	375	57	129	18	3	33	178	258	82	43	6	99	78	8	49	97	148	14	80	22	3	251	2.147
Unknown			12			8															6				1	27
Total	109	0	34	427	63	138	19	3	54	203	285	98	54	8	113	83	13	61	103	153	20	80	22	3	264	2.410

NORTHWEST

SEROTYPE	COLORADO	IDAHO	KANSAS	MONTANA	NEBRASKA	NEVADA	NORTH DAKOTA	OREGON	SOUTH DAKOTA	UTAH	WASHINGTON	WYOMING	NORTHWEST TOTAL	NORTH TOTAL
A.S. DYSENTERIAE														
Unspecified							1				1	2	4	5
1													0	0
2													0	1
3										1			1	3
4													0	2
9													0	0
Total	6	0	0	0	0	0	0	1	0	0	1	1	2	5
B.S. FLEXNERI														
Unspecified	23			1	2		2	9	34			3	74	126
1 Unspecified										6	14		20	21
1a													0	5
1b		3				2							5	7
2 Unspecified				9						12	6		27	49
2a				4		1	1						6	53
2b													0	7
3 Unspecified			2							1	1		4	24
3a													0	24
3b													0	1
3c													0	13
4 Unspecified				1							2		3	5
4a			1	1									2	12
4b													0	0
5													0	1
6	1		1	1						4	4		11	27
Total	24	3	4	17	2	3	3	9	34	23	27	3	152	375
C.S. BOYDII														
Unspecified									2				2	4
2											1		1	3
3													0	0
4													0	2
5													0	0
14													0	1
Total	0	0	0	0	0	0	0	0	2	0	1	0	3	10
D.S. SONNEI	94	16	52	37	1	6	3	11	7	27	103	2	359	2,506
Unknown	1						1			1	1		4	31
Total	119	19	56	54	3	9	8	20	43	52	133	7	523	2,933

TABLE 1A (Continued)

SHIGELLA SEROTYPES ISOLATED FROM HUMANS

THIRD QUARTER, 1974

SOUTHEAST										SOUTHWEST						OTHER							PREVIOUS QUARTER		
ALABAMA	ARKANSAS	FLORIDA	GEORGIA	LOUISIANA	MISSISSIPPI	NORTH CAROLINA	SOUTH CAROLINA	TENNESSEE	SOUTHEAST TOTAL	ARIZONA	NEW MEXICO	OKLAHOMA	TEXAS	SOUTHWEST TOTAL	SOUTH TOTAL	ALASKA	CALIFORNIA	HAWAII	VIRGIN ISLANDS	OTHER TOTAL	TOTAL	PERCENT OF TOTAL	TOTAL	PERCENT OF TOTAL	SEROTYPE
																									A.S. DYSENTERIAE
	1								1					0	1		45			45	51	0.9	4	0.1	Unspecified
						1		2	3	1			2	3	6					0	6	0.1	4	0.1	1
									0	1			1	2	2					0	3	0.1	8	0.2	2
									0		3			3	3					0	6	0.1	2	0.1	3
									0						0					0	2	0.0			4
			1						1						1					0	1	0.0			[illegible]
0	1	0	1	0	0	1	0	2	5	2	3	0	3	8	13	0	45	0	0	45	69	1.2	16	0.5	Total
																									B.S. FLEXNERI
	37				2			3	42		5	1	1	7	49		416			416	591	10.7	142	3.6	Unspecified
1			2						3		9			9	12					0	33	0.6	31	0.8	1 Unspecified
								3	3	14			7	21	24					0	29	0.5	14	0.4	1a
								1	1	36			8	44	45					0	52	0.9	38	1.0	1b
3		3	3			12			21		15			15	36					0	85	1.5	60	1.5	2 Unspecified
			1	5				6	12	60		3	27	90	102			6		6	161	2.9	100	2.5	2a
								1	1	4			14	18	19					0	26	0.5	19	0.5	2b
		3					2		5		24	1		25	30			3		3	57	1.0	25	0.6	3 Unspecified
				2				4	6	19			22	41	47					0	71	1.3	61	1.5	3a
									0	1			4	5	5					0	6	0.1	4	0.1	3b
				1					1	1			2	3	4					0	17	0.3	2	0.1	3c
									0		17			17	17					0	22	0.4	12	0.3	4 Unspecified
									0	37			7	44	44					0	56	1.0	14	0.4	4a
									0				3	3	3					0	3	0.1	3	0.1	4b
						1			1	1			2	3	4					0	5	0.1	5	0.1	5
		18		3					21	57	3		34	94	115			1		1	143	2.6	83	2.1	6
4	37	24	6	11	2	13	2	18	117	230	73	5	131	439	556	0	416	10	0	426	1,357	24.5	615	15.4	Total
																									C.S. BOYDII
									0	1				1	1	1	58			59	64	1.2	1	0.0	Unspecified
									0	8			11	19	19					0	22	0.4	4	0.1	2
									0				1	1	1					0	1	0.0	1	0.0	3
		1							1	1			1	2	3					0	5	0.1			4
									0	1				1	1					0	1	0.0	1	0.0	5
									0					0	0					0	1	0.0			14
0	0	1	0	0	0	0	0	0	1	11	0	0	13	24	25	1	58	0	0	59	94	1.7	14	0.4	Total
33	26	102	121	77	3	52	29	98	541	134	31	24	182	371	912	19	456	11	0	486	3,904	70.5	3,301	82.8	*D.S. SONNEI*
									0		1			1	1		81			81	113	2.0	38	1.0	Unknown
37	64	127	128	88	5	66	31	118	664	377	108	29	329	843	1,507	20	1,056	21	0	1,097	5,537		3,986		TOTAL

Table II

Relative Frequencies of Shigella Serotypes,
Third and Fourth Quarters 1974

Serotypes	Number Reported	Calculated Number	Calculated Percent	Rank
A. *S. dysenteriae*				
Unspecified	109			
1	12	45	.4	12
2	15	56	.5	11
3	10	38	.4	13
4	2	8	.1	19
9	2	8	.1	19
B. *S. flexneri*				
Unspecified	1134			
1 Unspecified	71			
1a	57	157	1.5	7
1b	89	245	2.4	6
2 Unspecified	160			
2a	283	777	7.6	2
2b	48	132	1.3	8
3 Unspecified	112			
3a	133	409	4.0	4
3b	8	25	.2	15
3c	29	89	.9	10
4 Unspecified	53			
4a	85	250	2.5	5
4b	5	15	.1	16
5	7	13	.1	17
6	262	485	4.8	3
Variant Y	1	2	0.0	21
C. *S. boydii*				
Unspecified	123			
1	1	3	.0	20
2	39	127	1.2	9
3	1	3	.0	20
4	9	29	.3	14
5	1	3	.0	20
9	1	3	.0	20
10	3	10	.1	18
14	1	3	.0	20
D. *S. sonnei*	7088	7258	71.2	1
Unknown	239			
Total	10,193	10,193		

Table III

Shigella Serotypes Isolated From Patients in Mental Institutions, by State, Third and Fourth Quarters 1974*

	S. dysenteriae 2	S. flexneri Unspecified	S. flexneri 1 Unspecified	S. flexneri 1b	S. flexneri 2 Unspecified	S. flexneri 2a	S. flexneri 2b	S. flexneri 3 Unspecified	S. flexneri 3a	S. flexneri 3c	S. flexneri 4a	S. flexneri 6	S. sonnei	Unspecified	Total
Florida	0	0	0	0	0	0	0	0	0	0	0	48	7	0	55
Georgia	0	0	0	0	0	1	0	0	0	0	0	0	4	0	5
Illinois	10	0	0	0	0	8	0	0	3	0	0	1	9	0	31
Kansas	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
Maine	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4
Massachusetts	0	9	0	0	0	0	0	0	0	6	0	2	9	0	26
Michigan	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Minnesota	0	0	0	0	0	0	0	0	0	0	0	0	11	0	11
New Jersey	0	0	0	0	0	0	0	8	0	0	0	0	1	0	9
Pennsylvania	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
South Carolina	0	0	0	0	0	0	0	1	0	0	0	0	1	0	2
Texas	0	0	0	1	0	0	1	0	0	0	0	0	0	0	2
Utah	0	0	1	0	36	0	0	0	0	0	1	1	50	1	90
Vermont	0	0	0	0	0	0	0	0	0	0	0	0	14	0	14
Wisconsin	0	0	0	0	0	0	0	1	0	0	0	0	1	1	3
Total	10	9	1	1	36	9	1	10	3	6	1	52	115	2	256

*California not included

Table IV

Shigella Serotypes Isolated from Non-human Primates, by State, Third and Fourth Quarters, 1974*

Serotype	Number	Source	State
S. dysenteriae 2	1	primate	Arizona
S. dysenteriae 6	1	monkey	Illinois
S. flexneri (unspec)	1	monkey	Louisiana
	1	monkey	Maryland
S. flexneri 1a	1	gorilla	Texas
S. flexneri 1b	1	monkey	Hawaii
S. flexneri 2 (unspec)	2	gorilla	Georgia
	1	chimp	Maryland
	2	monkey	Maryland
	1	rhesus monkey	Maryland
	7	monkey	New Mexico
	1	monkey	South Carolina
S. flexneri 2a	1	green monkey	Connecticut
	2	monkey	Connecticut
	4	monkey	Illinois
	1	orangutan	Texas
	1	siamang	Texas
S. flexneri 3 (unspec)	1	monkey	Georgia
S. flexneri 4 (unspec)	5	monkey	Georgia
	4	monkey	Maryland
S. flexneri 4a	3	monkey	Illinois
S. flexneri 4b	1	monkey	Connecticut
	3	monkey	Illinois
	1	rhesus monkey	Illinois
S. flexneri 5	2	gorilla	Illinois
S. sonnei	2	monkey	Illinois
	2	monkey	Maryland
	1	siamang	Texas

*California not included

Table V

Shigellosis Cases, by Age Group and Sex
United States, 1974*

Age (Years)	Male	Female	Unknown	Total	Percent	Cumulative Percent	Number of Reported Isolations per Million Population
Under 1	323	260	7	590	5.1	5.1	196.3
1 - 4	2346	2217	9	4572	39.8	44.9	343.8
5 - 9	1191	1175	1	2367	20.6	65.5	134.5
10 - 19	650	695		1345	11.7	77.2	32.4
20 - 29	467	900	1	1368	11.9	89.1	39.5
30 - 39	274	408		682	5.9	95.1	27.4
40 - 49	90	122		212	1.8	96.9	9.1
50 - 59	42	101		143	1.2	98.2	6.4
60 - 69	37	76		113	1.0	99.1	6.6
70 - 79	20	38	1	59	.5	99.7	6.1
80 or over	17	22		39	.3	100.0	9.0
Subtotal	5457	6014	19	11,490			
Child (Unspec)	48	43	6	97			
Adult (Unspec)	24	47		71			
Unknown	2142	2148	59	4349			
Total	7671	8252	84	16,007			
Percent	48.2	51.8					

*California not included

Table VI

Relative Frequencies of Shigella Serotypes Reported, 1974

Serotypes	Number Reported	Calculated Number	Calculated Percent	Rank*
A. *S. dysenteriae*				
Unspecified	149			
1	22	64	.3	12
2	34	99	.5	11
3	17	50	.3	14
4	3	9	.0	20
7	2	6	.0	22
9	2	6	.0	22
B. *S. flexneri*				
Unspecified	1948			
1 Unspecified	118			
1A	81	235	1.2	7
1B	139	403	2.1	5
2 Unspecified	300			
2A	470	1375	7.1	2
2B	77	225	1.2	8
3 Unspecified	167			
3A	241	715	3.7	4
3B	13	39	.2	15
3C	39	116	.6	10
4 Unspecified	67			
4A	119	335	1.7	6
4B	18	51	.3	13
5	17	32	.2	17
6	421	795	4.1	3
Varient X	1	2	.0	24
Varient Y	4	8	.0	21
C. *S. boydii*				
Unspecified	172			
1	4	12	.1	19
2	52	159	.8	9
3	2	6	.0	22
4	9	28	.1	18
5	3	9	.0	20
6	1	3	.0	23
9	1	3	.0	23
10	12	37	.2	16
13	1	3	.0	23
14	1	3	.0	23
D. *S. sonnei*	14,289	14,593	75.8	1
Unknown	404			
Total	19,420	19,421		

*Some serotypes are tied, and have been given the same rank

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The State Epidemiologists are the key to all disease surveillance activities. They are responsible for collecting, interpreting, and transmitting data and epidemiologic information from their individual States. Their contributions to this report are gratefully acknowledged. In addition, valuable contributions are made by State Laboratory Directors; we are indebted to them for their valuable support.

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